

DESCRIPTION OF THE ADVERTISEMENT CALL
AND RESOLUTION OF THE SYSTEMATIC
STATUS OF *LEPTODACTYLUS GRACILIS DELATTINI*
MÜLLER, 1968 (AMPHIBIA: LEPTODACTYLIDAE)

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Abstract. — The advertisement call of *Leptodactylus gracilis delattini* Müller is described from Campeche, Santa Catarina, Brazil and compared with calls from five populations of *L. gracilis* from mainland Brazil and calls of the closely related *L. furnarius* and *L. plaumanni*. Based on comparison of call data and re-examination of the holotype, *Leptodactylus gracilis delattini* Müller, 1968 is considered to be a strict junior synonym of *Leptodactylus gracilis* (Duméril and Bibron, 1841).

Leptodactylus gracilis delattini was described by Paul Müller in 1968, based on three individuals collected on Ilha Campeche, Santa Catarina, Brazil (27°42'S, 48°28'W), a tiny island located just off the southeastern part of the island of Santa Catarina (Fig. 1). *Leptodactylus gracilis delattini* was described as a subspecies on the basis of general morphological similarities with *L. gracilis*, but Müller (1968) knew of no geographically proximate specimens of *L. gracilis* on the large island of Santa Catarina or the mainland. Müller based his taxonomic decision solely on the basis of morphology, as he did not have any recordings of the advertisement call of the Ilha Campeche form. Later (Heyer 1978), *L. g. delattini* was considered a strict junior synonym of *L. gracilis*, again based on morphology, although the Ilha Campeche form was considered somewhat morphologically distinctive.

The advertisement call of *L. gracilis delattini* and calls of geographically proximate populations of *L. gracilis* are now available. The purposes of this paper are to describe the call of *L. gracilis delattini*, to compare *L. g. delattini*'s call with available calls from other populations of *L. gracilis*, and to reassess the systematic position of *L. g. delat-*

tini. In order to facilitate this latter aspect, we use the advertisement calls of *L. furnarius* and *L. plaumanni*, hypothesized close relatives of *L. gracilis* (see Heyer 1978), for comparative purposes.

Materials and Methods

Recordings analyzed for this paper are:

USNM (archives at National Museum of Natural History) Tape 247, cut 1, *Leptodactylus gracilis delattini*, recorded from USNM 319151, Brazil, Santa Catarina, Campeche (Fig. 1, locality 1), 22:10 h, 25°C air, by W. Ronald Heyer on 31 Dec 1991, using a Marantz portable tape recorder;

ASN (Arquivo Sonoro Neotropical) Tape AJC 27, cut 10, *Leptodactylus gracilis*, an unvouchered recording from Brazil, Santa Catarina, São José, Tubarão (Fig. 1, locality 2), 22:00 h, 23°C air, 24°C water, by Adão J. Cardoso, on 13 Feb 1982, using a Uher reel-to-reel portable tape recorder;

USNM Tape 11, cut 1, *Leptodactylus gracilis*, recorded from USNM 217781, Brazil, Santa Catarina, Santo Amaro da Imperatriz (Fig. 1, locality 3), 21:10 h, 22°C air, by W. Ronald Heyer on 19 Nov 1979;

ASN Tape IS 3, cut 11, *Leptodactylus gracilis*, an unvouchered recording from

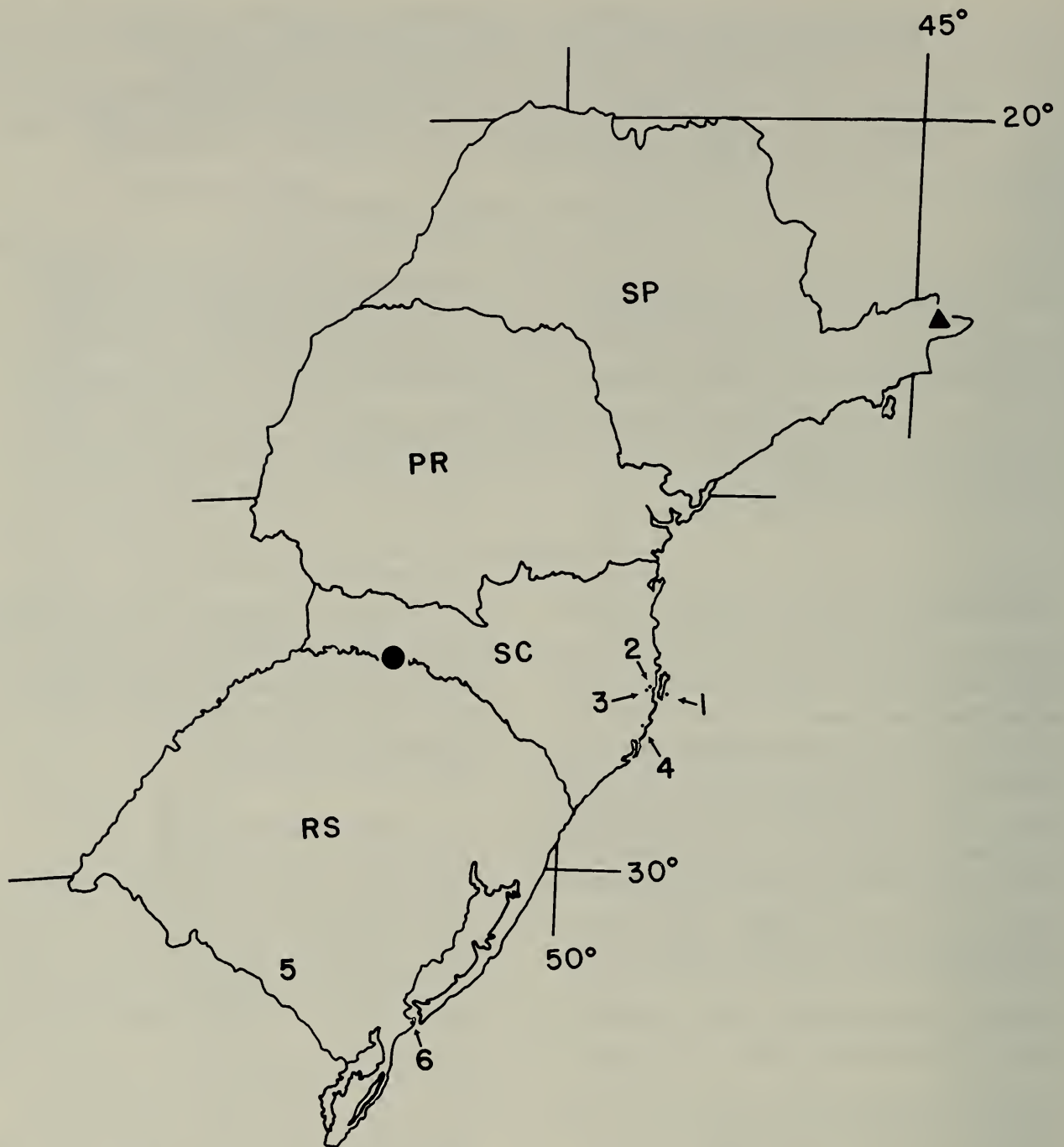


Fig. 1. Map of Brazilian States of São Paulo (SP), Paraná (PR), Santa Catarina (SC), and Rio Grande do Sul (RS), showing recording sites analyzed. 1 = *Leptodactylus gracilis delattini*, 2-6 *L. gracilis*, triangle = *L. furnarius*, dot = *L. plaumanni* (see methods and materials section for further locality information).

Brazil, Santa Catarina, Araçatuba (Fig. 1, locality 4), 21:00 h, 27.5°C air, 29°C water, by Ivan Sazima on 14 Feb 1971;

ASN Tape AJC 40, cut 5, *Leptodactylus gracilis*, recorded from ZUEC (Universidade Estadual de Campinas Departamento do Zoologia) 5310, Brazil, Rio Grande do Sul, Bagé (Fig. 1, locality 5), 19:30 h, 24°C air, 25°C water, by Adão J. Cardoso on 19

Dec 1982, using a Uher reel-to-reel portable tape recorder;

ASN Tape AJC 40, cut 2, *Leptodactylus gracilis*, an unvouchered recording from Brazil, Rio Grande do Sul, Rio Grande (Fig. 1, locality 6), 21:30 h, 24°C air and water, by Adão J. Cardoso on 18 Dec 1982, using a Uher reel-to-reel portable tape recorder;

ASN Tape AJC 73, cut 5, *Leptodactylus*

furnarius, recorded from ZUEC 6360, Brazil, São Paulo, São José do Barreiro, Fazenda do Bonito (Fig. 1, triangle), 18:50 h, 19°C air, 23°C water, by Adão J. Cardoso on 13 Feb 1987, using a Uher reel-to-reel portable tape recorder;

ASN Tape AJC 41, cut 7, *Leptodactylus plaumanni*, an unvouchered recording from Brazil, Santa Catarina, Nova Teutônia (Fig. 1, dot), 20:00 h, 23°C air, 22°C water, by Adão J. Cardoso on 21 Dec 1982, using a Uher reel-to-reel portable tape recorder.

From 6 to 46 calls per recording were analyzed on a Kay Elemetrics Digital SonaGraph Model 7800 for the parameters of call structure (harmonics, pulses), range of broadcast frequencies, frequency modulation, intensity modulation, and call duration. Up to 50 second duration portions of calls were analyzed with a UNISCAN II Model 4600 for call rate and call group data.

Specimens examined are from the Museu de Zoologia da Universidade de São Paulo (MZUSP) and National Museum of Natural History, Smithsonian Institution (USNM).

Results

The individual recording made for *L. gracilis delattini* did not come from Ilha Campeche, but was recorded immediately adjacent to Ilha Campeche on the island of Santa Catarina at the town of Campeche. We have compared the call voucher (USNM 319151) with the holotype of *L. gracilis delattini* (MZUSP 56589). Morphologically, they are virtually identical, differing slightly in size and body coloration. The holotype is 38.0 mm SVL, the call voucher 37.0. The dorsum of the holotype is brown; that of the call voucher gray. The ventral surface is brownish-cream on the holotype and yellowish-white on the call voucher. The previous statement by Heyer (1978:36) that the dorsal surface of the tibia (=shank) of the holotype lacks light stripes (Heyer 1978:36) is only partially correct. The holotype is generally darker than fresh, well-preserved specimens of *L. gracilis* (due to preservation

artifact), so the light stripes are not pronounced and the dorsalmost stripe found in *L. gracilis* is not apparent. The more lateral light-colored stripe is visible on both shanks of the holotype, however. In the call voucher, the more lateral light-colored shank stripes are very distinct, more so than the somewhat interrupted more dorsal shank stripes.

Call of *Leptodactylus gracilis delattini*

In one 50 second period analyzed, there are three well-defined call groups of 2.5–4.5 sec duration, with 10–17 calls per group, and 4.8–7.8 seconds between call groups. The range of call rates within call groups is 3.4–4.0 per sec, and call duration ranges from 0.04–0.05 sec. The call is pulsatile, with some variation between the recordings (calls from the first part of the recording are strongly pulsed and weakly pulsed in the second; the differences are likely due to placement of the microphone on the ground in the first part of the recording while in the second part the microphone was hand held). The call apparently lacks harmonic structure. The call broadcast frequencies range from 1300–3200 Hz. Calls are frequency and intensity modulated; of lowest frequency and quietest at the beginning, rapidly rising in frequency and achieving greatest intensity at the end of the call in the range of 2500–3200 Hz (Fig. 2).

Comparison With Other Calls

The call of *L. gracilis delattini* compared with calls from five other populations of *L. gracilis* and calls of the related *L. furnarius* and *plaumanni* indicate that none of the calls appear to have harmonic structure (Table 1). The calls from the mainland populations of *L. gracilis* demonstrate but minor variation among themselves (Table 1), at the level expected for individual variation within populations. The call of *L. gracilis delattini* differs no more from the calls analyzed from the five populations of *L. grac-*

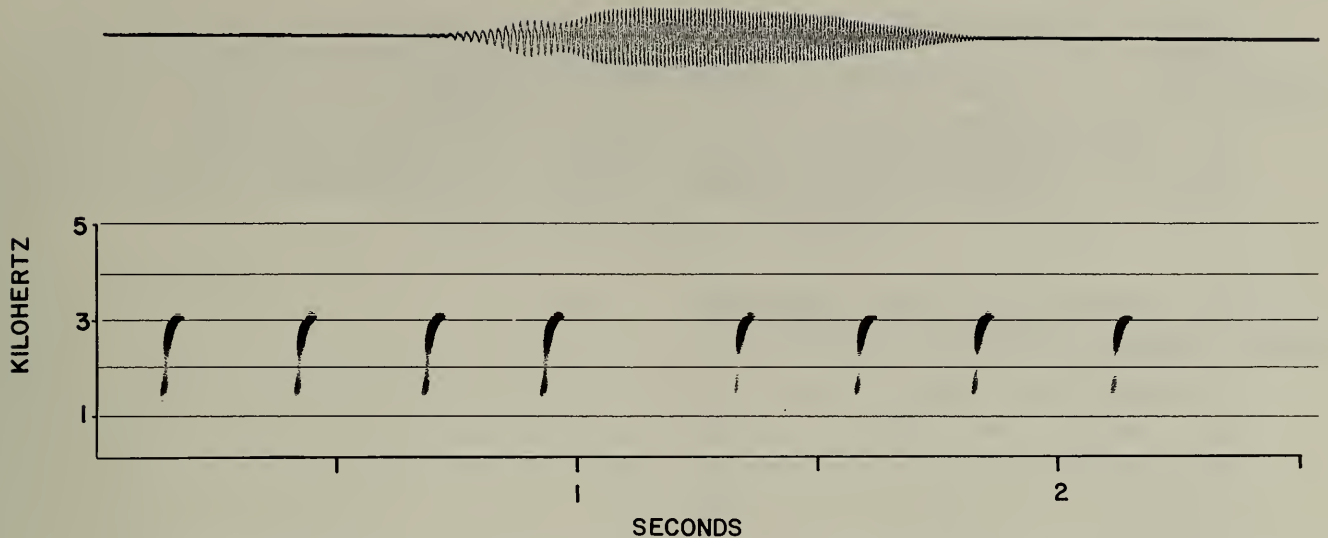


Fig. 2. Advertisement call of *Leptodactylus gracilis delattini*. Audiospectrogram made with narrow band (45 Hz) filter. Wave form of the first call shown on audiospectrogram, entire signal length of wave form analysis 0.107 sec.

ilis than the calls from the five populations of *L. gracilis* differ among themselves. In contrast, the differences among the recordings of *L. gracilis* (including *delattini*), *L. furnarius*, and *L. plaumanni* are more pronounced. The calls of *L. furnarius* differ from those of *gracilis* (including *delattini*) in having a rapid rise in frequency rather than an extremely fast rise in frequency and in frequency range (*L. furnarius* 2080–2950 Hz, *L. gracilis* 890–3230 Hz). The *L. plaumanni* calls differ from those of *L. gracilis* (including *delattini*) in range of broadcast frequencies (*L. plaumanni* 2640–3380 Hz, *L. gracilis* 890–3230 Hz) and call rate per second (*L. plaumanni* 20.7–23.1, *L. gracilis* 1.4–4.0). The differences observed among the calls of *L. gracilis* (including *delattini*) and those of *L. furnarius* and *plaumanni* are at the level that code species information (Straughan 1973), whereas the call of *L. gracilis delattini* is essentially indistinguishable from the other recordings of *L. gracilis* analyzed.

Conclusion

Based on analysis of the advertisement call of *L. gracilis delattini*, we conclude that *L. gracilis delattini* Müller, 1968 is a strict synonym of *L. gracilis* (Duméril and Bi-

bron, 1841). We find no morphological or call data to suggest that the Ilha Campeche population of *L. gracilis* is distinctive at the subspecies level.

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